

# the alchemy of waste, turning trash into gold

A continuing rise in the rate of waste production is no longer acceptable – hazardous waste affects the health of millions of people and poisons large areas of our planet. In many places people live surrounded by garbage and landfills. It is essential that governments and corporations face up to waste, using what we know about reduction, recycling and reuse, but also developing new technologies that eliminate waste.

#### To sign or not to sign

There are four major international treaties that deal with toxic material. The first of these, the Basel Convention was adopted in 1989 to regulate the transboundary movements of hazardous and other wastes. An amendment was adopted in 1995 (the Basel Ban Amendment) to ban the export of hazardous waste from OECD countries and Liechtenstein to non-OECD countries; the 1996 London Convention Protocol, which prevents most forms of ocean dumping; and the Stockholm Convention, designed to phase out the production of persistent organic pollutants (POPs). Some countries have signed and implemented all four treaties, some countries are yet to sign any.

#### Waste not, want not

A number of international and national regulations now state that producers have to be held accountable for the amount and toxicity of the waste they produce. However, even though this principle of 'polluter-pays' started a few decades ago, the price of many products, like computers, still does not include the full cost of recycling and disposal. As an alternative, some businesses and governments (mostly in developed countries) are moving to 'clean production' and eco-design principles. These include the intelligent use of raw materials and steering production towards the use of durable non-toxic components that are easy to reuse, remanufacture, or recycle.

Zero waste initiatives are also gathering speed. The idea of zero waste is based on the belief that all discarded materials have resource potential (and hence they are not really waste). This approach looks for alternatives to incineration and landfills. Some countries, like New Zealand, are promoting zero waste in their economic development agenda - building on their image as an exporter of clean green products (zero waste, NZ).

**Smart waste**

High tech research in the world of waste is looking for ways to clean up the mess. Enzyme producing bacteria can convert toxic products like oils and pesticides into carbon dioxide and other byproducts. And bacteria may one day be harnessed to deal with non-organic waste like heavy metals. Scientists have discovered unusual bacteria that live deep in the earth. They use chemicals in the rocks to produce energy, in the process concentrating heavy metals. Biotechnology applications include the remediation of contaminated sediments and the development of innovative mining techniques (ODP, CSIRO).

Science is also focused on finding ways to minimize waste by turning it into products. The plastic bag made from animal excrement or food waste is a reality (EBCRC), along with bricks, insulation, carpet, shoes, clothes and a whole range of other products, all made from some sort of waste. Another strategy is to developing ways to replace products made from non-renewable and non-recyclable materials in order to eliminate waste. Potential products made from renewable resources include the soybean car, in which the petroleum-based plastics are replaced with a durable soybean composite, or the chicken feather micro-chip which utilizes chicken feathers and plant oils in place of silicon (University of Delaware, ACRES).

**Beyond waste**

Waste is a crisis of our own doing, (the result of a collision between rising living standards and insufficiently regulated capitalism). It is becoming more and more difficult to just run faster, catch up and solve the problem. There are just too many of us, producing too much waste. Long-term, viable solutions require action at every level – personal, corporate and government. It must start with acceptance of responsibility for waste, whether we are consumers or manufacturers. Once this happens the next step is anticipation. The eventual fate of every product must be anticipated at the outset, costed, and this cost built into the production process and/or the life of the product. Finally it requires a co-ordinated series of legislative measures, research funding and public education, and the development of public-private partnerships that can bring additional technical and financial resources and innovative solutions to the 21st century challenges.